WHAT IS CLAIMED IS:

1. A coherent light source for simultaneously emitting a first light and a second light having a wavelength shorter than that of the first light, comprising:

a light source main body emitting at least the first light;

a member transmitting or reflecting the first light; and

a functional film being provided on at least a part of the member,

the functional film having a photocatalytic effect to be induced by the second light.

2. The coherent light source according to claim 1, wherein

the wavelength of the first light is 400 nm or longer.

3. The coherent light source according to claim 1, wherein

the first light and the second light travel approximately the same optical paths.

4. The coherent light source according to claim 1, wherein

the first light and the second light irradiate approximately equal areas on an irradiation surface of the member including the functional film.

5. The coherent light source according to claim 1, wherein

the light source main body includes a semiconductor laser formed of a III-V nitride semiconductor material.

6. The coherent light source according to claim 1, wherein

the wavelength of the second light is 390 nm or shorter.

7. The coherent light source according to claim 1, further comprising

a first wavelength conversion element for converting a part of the first light to the second light.

8. The coherent light source according to claim 7, wherein

the first wavelength conversion element is formed of a nonlinear optical material or an upconversion material.

9. The coherent light source according to claim 7, wherein

the light source main body is formed of a solid-state laser medium including Nd or Yb, and

the first wavelength conversion element converts the first light emitted from the solid-state laser into the second light which is a third harmonic.

10. The coherent light source according to claim 7, wherein

the light source main body is formed of a solid-state laser medium including Nd or Yb and a second wavelength conversion element for converting light from the solid-state laser into the first light which is a second harmonic, and

the first wavelength conversion element converts the light from the solid-state laser and the first light into the second light which is sum frequency light.

11. The coherent light source according to claim 7, wherein

the light source main body is formed of a semiconductor laser, and

the first wavelength conversion element converts the first light emitted from the semiconductor laser into the second light which is a higher harmonic.

12. An optical system, comprising:

a coherent light source for simultaneously emitting a first light and a second

light having a wavelength shorter than that of the first light;

a condensing or projecting optical member; and

a functional film being provided on at least a part of the optical member which receives irradiation of light from the coherent light source ,

the functional film having a photocatalytic effect to be induced by the second light.

13. The optical system according to claim 12, wherein

the functional film is provided on an irradiation surface which receives the first light at power density of 100 W/cm^2 or higher in the optical member, and

the first light and the second light irradiate approximately equal areas on the irradiation surface.